



# Swift Energy and Saka Energi Indonesia Successfully Utilize CobraMax® DM (Using Coiled Tubing) Completion Service to Overcome Wellbore Restriction

## MULTISTAGE STIMULATION PROCESS EXECUTES A RECORD NUMBER OF FRACTURE STAGES.

EAGLE FORD SHALE, WEBB COUNTY, TEXAS

### CHALLENGE

- » Successfully complete a horizontal well with casing deformation, thus preventing the plug-and-perf process
- » Complete well within the customer's operational time frame and budget, without jeopardizing casing integrity

### SOLUTION

- » Deploy CobraMax® DM service as an alternate completion method to perform multistage fracturing treatments in the lateral

### RESULT

- » Successfully placed 68 fracturing stages (a global Halliburton record)
- » Pumped a total of 5.71 million lb of proppant
- » Met the adjusted production volumes for the well

### OVERVIEW

The majority of the wells in the Eagle Ford are completed using the plug-and-perf method. This method requires a full-wellbore inside diameter to allow the bottomhole assembly (BHA) to reach the desired target depths. When Swift Energy Operating, LLC (Swift Energy) and its joint venture partner Saka Energi Indonesia encountered an impassible section of the wellbore, the company used CobraMax® DM service as an alternate completion method for overcoming the problem.

### CHALLENGE

During a pre-frac cleanout, the wellbore did not allow the passage of a BHA larger than 2.875-inch OD. Future diagnostics would reveal a deformation in the casing occurring over an interval in the vertical section of the well (Figure 1).

Coupled with this finding was the uncertainty of the casing's pressure integrity (subsequent tests would confirm casing was integral). Swift Energy had the option of making an effort to repair the casing or to identify an alternative completion method

that would be effective using the existing wellbore. These repair options would yield a higher cost with increased risks, and would not guarantee wellbore integrity after remediation.

The decision was made to investigate completion methods capable of implementation in the well's current state. These included, but were not limited to, perforating and stimulating the entire wellbore by using diversion agents, sand plugs for stage isolation, and various coiled tubing fracturing methods.

### SOLUTION

Halliburton recommended the CobraMax DM service to complete the well. CobraMax DM service utilizes coiled tubing or jointed pipe, and enables placement of numerous fracturing stages in a horizontal section, while offering the flexibility of on-demand downhole changes

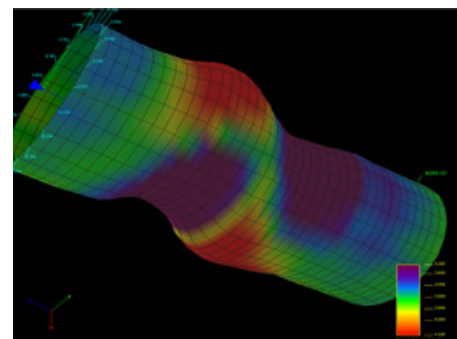


Figure 1.

in proppant concentrations. In this process, nonabrasive fluid is pumped at a high rate down the annulus and is mixed downhole with proppant slurry injected down the coiled tubing.

**RESULT**

Swift Energy completed the well by using CobraMax DM service on the existing wellbore. This saved significant time and the cost of a remedial intervention, and the program was executed within the desired time frame.

Highlights of this CobraMax DM multistage stimulation process are given below:

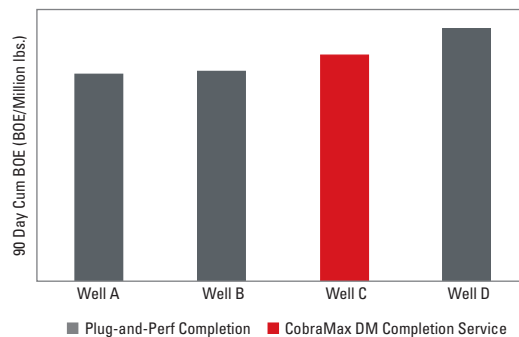
- » Executed 68 fracture stages with a global Halliburton record (26 meters) to 110 feet (34 meters)
- » Achieved an average of four stages per day, reaching a maximum of seven stages per day
- » Pumped a total of 5.71 million lb of proppant
- » Cluster spacing varied from 85 feet
- » Average rate per cluster ranged from 13.5 BPM to 14.5 BPM
- » The ability to manipulate proppant concentrations by using the downhole mixing technique helped avoid screen-outs resulting in less NPT

It became necessary to manage the well’s production expectations, as it was completed with substantially less clusters and proppant than its offsets. Reservoir and mechanical limitations prevented CobraMax DM service from initiating comparable cluster density. Normalized comparisons were needed to evaluate the effectiveness of the CobraMax DM technology.

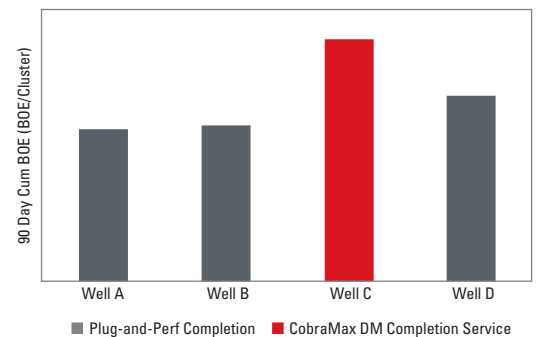
Figure 2 shows a comparison of 90-day cumulative barrels of oil equivalent (BOE) normalized by the total proppant pumped between the CobraMax DM well (Well C) and the three plug-and-perf offsets. Figure 3 shows a 90-day cumulative BOE normalized by the number of clusters.

Due to its operational success in helping this well meet the adjusted production expectations, Swift Energy believes the CobraMax DM process can be considered as a viable completion option when casing deformation may be present.

*Figure 2.*



*Figure 3.*



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